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09/741,980	12/19/2000	Yasuhiro Teramoto	16869P015900	7969

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EXAMINER

BAKER, PAUL A

ART UNIT

PAPER NUMBER

2188

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/741,980

Applicant(s)

TERAMOTO, YASUHIRO

Examiner

Paul A Baker

Art Unit

2188

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-13 and 24-26 is/are allowed.
- 6) ☒ Claim(s) 1-9, 14, 18-21, 23 and 27-29 is/are rejected.
- 7) ☒ Claim(s) 15-17, 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-9,14,18-21,23,27-29 rejected under 35 U.S.C. 102(b) as being anticipated by Emmot et al. US Patent 5,860,078.

In regards to claim 1, Emmot discloses a cache directory configuration, wherein each cache comprises a copy of a section of said main memory, said method comprising:

storing copies of address tags stored in said plurality of caches in a cache directory which has at least one entry each including a plurality of bits, wherein the bits of each entry in said cache directory is divided into a plurality of parts in column 43 lines 28-31; and

processing a plurality of search requests concurrently using said plurality of parts in column 43 lines 40 - 48.

In regards to claim 2, Emmot discloses partitioning a search address tag associated with said search request into a plurality of sections;

responsive to said search request, determining if a first section of said plurality of sections matches an entry in a first part of said plurality of parts; and

when no match is indicated for any entry in said first part, returning a result in column 44 lines 39-43.

In regards to claim 3, Emmot discloses when a match is indicated for any entry in said first part, determining if a second section of said plurality of sections matches an entry in a second part of said plurality of parts in column 44 lines 33-39.

In regards to claim 4, Emmot discloses each entry in said cache directory is divided up into a plurality of entry groups; and each entry group can be operated on independently in column 43 lines 23-39 by providing a total of 20 comparators on a fully associative cache all portions of the directory can be operated on independently.

In regards to claim 6, Emmot discloses responsive to a search request of said plurality of search requests, determining if said search request matches any entry in a part of said plurality of parts; and when a match is indicated, returning a result in column 43 lines 48-54.

In regards to claim 7, Emmot discloses an information processing device comprising:

a plurality of processing devices, each of said plurality of processing devices comprising a cache storage module storing a copy of a section of a main storage device in figure 5 elements 200A-200D;

the main storage device shared by said plurality of processing devices and formed as a plurality of banks, wherein said banks having different address spaces and capable of operating in parallel in figure 5 elements 204A-204B; and

a coherence control device comprising a cache directory for providing coherence between a cache storage module and said main storage device, said cache directory storing copies of address tags associated with said cache storage module, each copy of address tag including a plurality of bits, the bits of each copy of address tag of said cache directory being divided into a plurality of units capable of operating in parallel in column 43 lines 28-31, and said coherence control device processing a plurality of search requests concurrently using said plurality of units in figure 5 elements 76, 78, 92.

In regards to claim 8, Emmot discloses a method for searching a cache directory comprising:

receiving a search request address tag having a plurality of bits ;

partitioning the bits of said search request address tag into a first plurality of sections;

partitioning the bits of each address tag of said plurality of address tags into a second plurality of sections;

comparing for each address tag, a first section of said first plurality of sections with a first section of said second plurality of sections; and

returning a result when said comparing indicates no match for any address tag of said plurality of address tags in column 43 lines 28-54.

In regards to claim 9, Emmot discloses said comparing indicates a match for any address tag of said plurality of address tags, further comparing for each address tag, a second section of said first plurality of sections with a second section of said second plurality of sections in column 43 lines 48-54.

In regards to claim 14, Emmot discloses a method for searching a cache directory used in maintaining coherence among caches in a multiprocessor system, the cache directory having at least one entry each including a plurality of bits, the method comprising:

partitioning the bits of each entry in the cache directory into a plurality of parts, wherein each part of the plurality of parts is searched concurrently with another part of the plurality of parts in figure 8 206A-D;

partitioning a plurality of requests to the cache directory into a plurality of sub-requests, wherein each sub-request corresponds to a part of the plurality of parts; and searching in parallel, each part using an associated sub-request in column 43 lines 23-39.

In regards to claim 18, Emmot discloses a cache directory configuration system for maintaining coherence between a plurality of caches, wherein each cache comprises a copy of a section of said main memory, said system comprising:

a cache directory, comprising copies of address tags stored in said plurality of caches, each copy of address tag having a plurality of bits, wherein the bits of each copy of address tag in said cache directory are divided into a plurality of parts; and

a plurality of units for processing a plurality of search requests concurrently using said plurality of parts in column 43 lines 23-39.

In regards to claim 19, Emmot discloses:

a selector module for partitioning a search address tag associated with said search request into a plurality of sections in figure 5 cache controller; and

a first comparison module, responsive to said search request, for determining if a first section of said plurality of sections matches an entry in a first part of said plurality of parts and when no match is indicated for any entry in said first part, returning a result in column 43 lines 48-54.

In regards to claim 20, Emmot discloses:

when a match is indicated for any entry in said first part, a second comparison module for determining if a second section of said plurality of sections matches an entry in a second part of said plurality of parts in column 43 lines 48-54.

In regards to claim 21, Emmot discloses:

each entry in said cache directory is divided up into a plurality of entry groups;
and
each entry group can be operated on independently in column 43 lines 48-54.

In regards to claim 23, Emmot discloses:

a comparison module, responsive to a search request of said plurality of search requests, for determining if said search request matches any entry in a part of said plurality of parts, and when a match is indicated, returning a result in column 43 lines 48-54.

In regards to claim 27, Emmot discloses a cache directory configuration system for maintaining coherence between a plurality of caches, wherein each cache comprises a copy of a section of said main memory, said system comprising:

a cache directory, comprising copies of address tags stored in said plurality of caches, wherein said cache directory is divided into a plurality of parts figure 5 element 76,78,92 ;

a plurality of units for processing a plurality of search requests concurrently using said plurality of parts figure 5 elements 200A-200D;

a selector module for partitioning a search address tag associated with said search request into a plurality of sections; and

a first comparison module, responsive to said search request, for determining if a first section of said plurality of sections matches an entry in a first part of said plurality of parts and when no match is indicated for any entry in said first part, returning a result in column 43 lines 40-59.

In regards to claim 28, Emmot discloses:

when a match is indicated for any entry in said first part, a second comparison module for determining if a second section of said plurality of sections matches an entry in a second part of said plurality of parts in column 43 lines 40-59.

In regards to claim 29, Emmot discloses a cache directory configuration system for maintaining coherence between a plurality of caches, wherein each cache comprises a copy of a section of said main memory, said system comprising:

a cache directory, comprising copies of address tags stored in said plurality of caches, wherein said cache directory is divided into a plurality of parts in figure 5 element 76,78,92;

a plurality of units for processing a plurality of search requests concurrently using said plurality of parts in figure 5 elements 200A-D; and

a comparison module, responsive to a search request of said plurality of search requests, for determining if said search request matches any entry in a part of said plurality of parts, and when a match is indicated, returning a result in column 43 lines 40-59.

Allowable Subject Matter

Claims 15-17, 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 10 – 13, 24-26 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: Emmot represents the closest prior art of record, Emmot's invention is primarily concerned with read requests, and therefore does not adequately disclose the processing of write requests within his invention. Since claims 10 and 24 are claims drawn to write requests, these claims are found allowable over the prior art of record.

Claims 11-12 are allowable as being dependent on allowed claim 10.

In regards to claims 13 and 24, Emmot does not disclose the use of a switch configured to select a section of the plurality of sections associated with a memory bank. Due to the architecture and intended purpose of Emmot's invention, it would not have been obvious to one of ordinary skill in the art to place a switch in Emmot's invention.

In regards to claim 25 and 26, Emmot does not disclose a sub-request comprising of either the even or odd bits of a request, in combination with the other claim limitations presented.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A Baker whose telephone number is (703)305-3304. The examiner can normally be reached on M-F 10am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (703)306-2903. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PB


GARY PORTKA
PRIMARY EXAMINER